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TECHNICAL NOTES

LAKE STATES FOREST EXPERIMENT STATION U.S. DEPARTMENT OF AGRICULTURE · · FOREST SERVICE

No. 607

Stand Density Influences Stem Taper
in a Thinned Red Pine Plantation

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In a red pine plantation thinning experiment under way in Lower Michigan since 1951, diameter increment at 4.5 feet and 17.0 feet was measured to determine the effects of stand density on taper in the first log. Although growth at both 4.5 and 17.0 feet decreased with increasing basal area density, the changes in stem taper were relatively small over broad ranges of stand density (fig. 1). Stem taper was about the same at 100 and 140 square feet of basal area, but at 60 square feet it increased and at densities above 140 square feet per acre it decreased.

This thinning study was established in 1951 in a 43-year-old red pine plantation initially spaced at 4x5 feet. Basal area at the first thinning averaged 200 square feet per acre. Total height and height to live crown averaged 38 and 19 feet, respectively. Densities from 60 to 160 square feet per acre were established in 2-acre compartments which were marked to leave the highest quality trees regardless of crown class. In 1956 each compartment was rethinned to the designated basal area.

In 1960 changes in stem taper based on growth at 4.5 and 17.0 feet were measured on 9 potential sawtimber trees in each of the thinned compartments and the unthinned area. Diameter growth at breast height was computed from the periodic measurements. Radial growth inside the bark at 17 feet was measured on increment borings and doubled to obtain the diameter increment. Differences in diameter growth at breast height and 17 feet were taken to indicate changes in stem form. The test was limited to individual tree growth and does not include total growth and value per acre.

The fastest diameter growth at both 4.5 and 17.0 feet was obtained at the lowest density of 60 square feet per acre. At this stand density, growth at 4.5 feet was 20 percent greater than at 17.0 feet, resulting in increased stem taper.

As stand density increased from 100 to 140 square feet, diameter growth decreased at both 4.5 and 17.0 feet at about the same rate. At 200 square feet per acre, diameter growth at 17 feet exceeded that at 4.5 feet during the 8-year study period and thereby decreased butt log taper. This trend, of course, cannot be expected to continue indefinitely.

In this study and period of measurement, basal area densities of 60 to 100 square feet provided the most rapid stem increment in the first log with only slight increase in taper. Whether this trend continues with increasing age still remains to be determined.

RICHARD E. LOHREY,
Research Forester.

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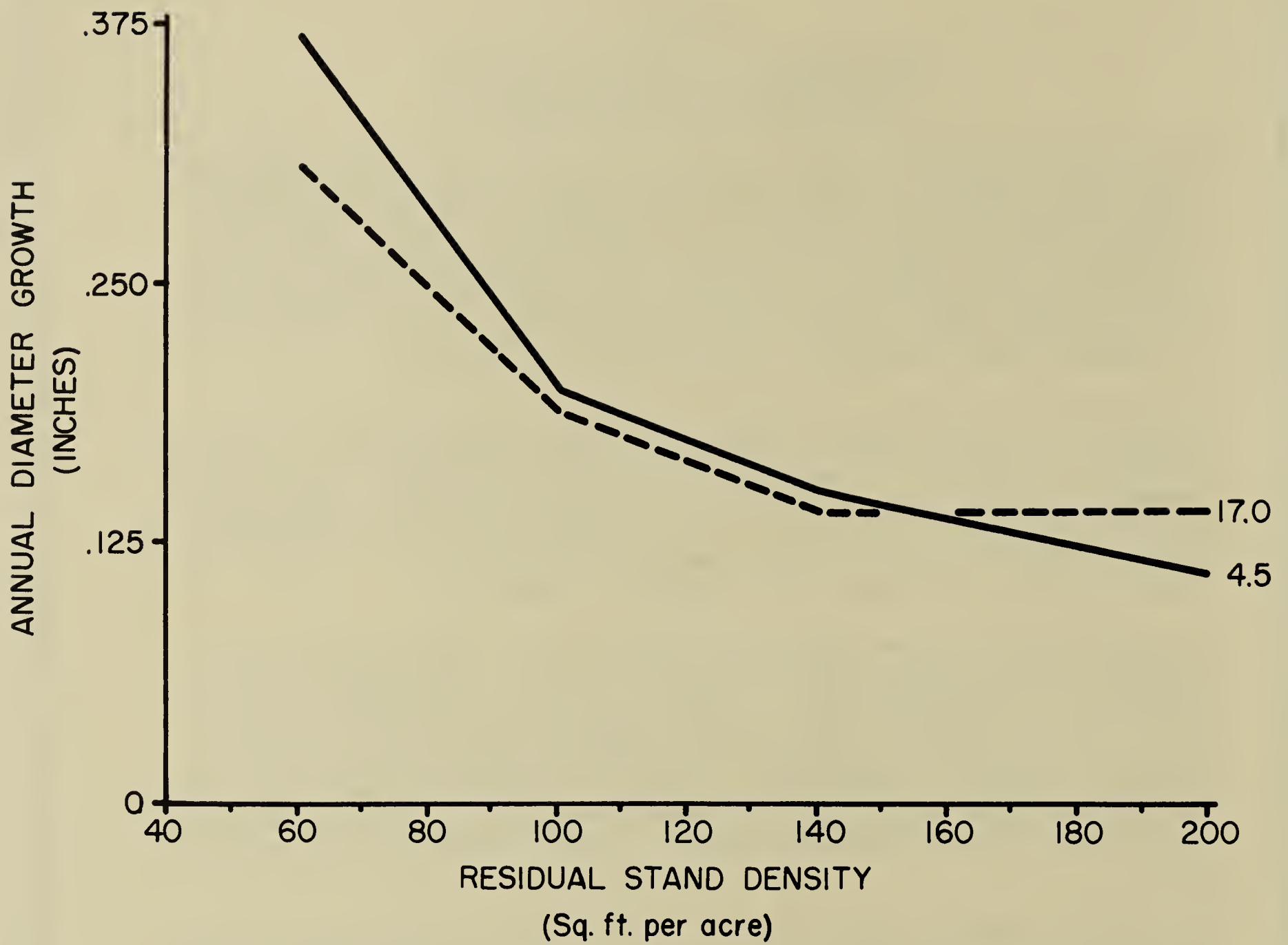


Figure 1.--Mean periodic annual diameter growth in a thinned red pine plantation, by basal area density; measurements are at 4.5 feet and 17 feet on the stem.